tration possesses the same activation energy as the conductance. When the Hall mobility arises from an excitation process the logarithmic corrections are modified by the lifetime which can be varied simply by varying the Fermi energy.

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**On leave from Sony Corporation Research Centre, Yokohama, Japan.
1 M.J. Uren, R.A. Davies and M. Pepper, J. Phys. C. in the press. 2 D.J. Bishop, D.C. Tsui and R.C. Dynes, Phys. Rev. Lett., in the press. Also, Phys. Rev. Lett., 44, 1153, 1980.

JI 6 Sharp Metal-Insulator Transition in a Random Solid. G. A. THOMAS, Bell Labs., T. F. ROSENBAUM, Bell Labs. and Princeton U., and K. DeCONDE, Princeton U.--We have measured zero temperature metallic conductivities above and below Mott's minimum value σ_{MIN} in bulk crystals of P doped Si. Studies of lattice heating, electronic heating and macroscopic inhomogeneities support the finding that conductivities below σ_{MIN} increase by over 10^3 as the P density is increased by 1%, and that over a wider density range the data can be fit to a scaling form with a characteristic length that tends to diverge with the same exponent ($\nu = 0.55 \pm 0.10$) in the metal and insulator.

JI 7 Conductivity Cusp in a Disordered Metal. T. F. ROSENBAUM*, K. ANDRES+, G. A. THOMAS, and P. A. LEE, Bell Labs., Murray Hill--We observe a tendency toward a cusp at zero temperature in the electrical conductivity of Si crystals doped with P. We find that, within the metallic state, decreasing P concentration enhances the cusp and then rapidly changes its sign as a pseudogap opens. The effect is small: 15% maximum conductivity change between .04 and 4 K. Such a cusp has been predicted for a disordered metal in which Coulomb interactions dominate the scattering, and the measured magnitude of the cusp as a function of P density agrees to within a factor of two with the theory.

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JI 8 Localization Effects in Thin Pt Wires.* J. T. MASDEN and N. GIORDANO, Purdue U.--The resistance of Pt wires with cross sectional areas (A) as small as 2.3×10^{-12}cm^2 ($\sqrt{A}$ = 150 Å) has been studied at low temperatures (T). The wires exhibit a resistance rise as the temperature is lowered, and the variation of the rise with A and T is the same as that found previously for thin wires made of other materials[1]. Combining the results for Pt with those for other materials we find that the resistance rise varies approximately linearly with the amount of disorder. This result is inconsistent with theories based on Coulomb scattering effects[2]. If this result is interpreted in terms of current theories of localization[3], it implies that the inelastic mean free path is independent of the amount of disorder, a conclusion which is very difficult to reconcile with present ideas concerning inelastic scattering in dirty metals.

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JI 9 Electronic Transport in One-dimensional Disordered Systems, B. KRAMER, A. MACKINNON, PTB Braunschweig, F.R.G. and J. SAK, Rutgers U.*--We study the conductance G and the resistance R of one-dimensional disordered systems of finite length L. An array of randomly spaced delta-function potentials is investigated both analytically and numerically using the transmission coefficient (T) formulation. A system of finite length described by the Anderson hamiltonian with ideal metals on both ends is treated numerically using the Kubo-Greenwood formula. The latter contains inelastic scattering phenomenologically via an inverse scattering time Δ. It is shown that $\ln T$ is gaussian distributed and obeys the central limit theorem. This theorem is not obeyed by R and G. The averages of R and G grow and decrease exponentially, respectively and $\langle R^{-1} \rangle + \langle G \rangle$. The results from the Kubo-Greenwood formula suggest that for $\Delta > 0$ the conductance obeys the central limit theorem. For large L the average of G tends to a finite value which is proportional to Δ.

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JI 10 New Numerical Method for Electronic Properties of Disordered Systems, W. GRAUDENZ, U. Dortmund, B. KRAMER, A. MACKINNON, PTB Braunschweig, F.R.G.--We have developed a numerical method, which can treat "macroscopic" disordered systems. The idea is that a physical quantity for a system consisting of N atoms, say A(N) is expressed as a function of the same quantity for N-1 atoms, i.e. A(N-1): F(A(N-1)). Thus we obtain relations for the participation number, the density of states, and the conductivity, which we have applied to a system described by the Anderson hamiltonian containing up to 10^9 atoms in one dimension. This is equivalent to a wire of length 2 cm. The results indicate that all states are localized and that the DC-conductivity vanishes in the limit of zero temperature. First results in two dimensions are also presented.

JI 11 Numerical Studies of Three Dimensional Site-Dilute Systems with Exponential Interactions.* W. Y. CHING, University of Missouri-Kansas City and D. L. HUBER University of Wisconsin-Madison.--We study the energy levels and wave functions of a three dimensional site-dilute system with exponential interactions. The tight binding Hamiltonian is of the form $V_{ii}=0$, $V_{ij} = V_o \cdot \exp[-\alpha r_{ij}]$ $(i \neq j)$, where r_{ij} is the separation between sites i and j. Atoms are distributed at random on an fcc lattice with periodic boundary conditions. We focus attention on the dilute regime where the concentration of atoms is less than 0.01. The density of states and the localization indices are calculated as a function of α for arrays of several hundred atoms. The critical value of α for the disappearance of the extended states is estimated and comparisons are made with various predictions.[1,2]

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JI 12 The conductivity of systems with strong diagonal and off-diagonal disorder. D. Belitz and W. Götze* Technical University Munich, W. Germany.-- Self-consistency equations for the relaxation of currents and propagation of density fluctuations in strongly disordered electron systems are derived and solved. The interplay of diagonal and off-diagonal disorder is discussed and a detailed analysis of the phase diagram for the Anderson transition of the conductivity and localization length near the mobility edge of the dynamical conductivity and of the density fluctuation spectrum is presented.

JI 13 Effects of Pressure on the Anderson Transition in $Fe_{0.25}Nb_{0.75}Se_3$,* S.J. Hillenius and R.V. Coleman, University of Virginia -- The Anderson type of metal-insulator transition observed below 140 K in $Fe_{0.25}Nb_{0.75}Se_3$ has been studied under applied pressure in the range 0-12 k bar. Hydrostatic pressure of about 12 k bar reduces the rise in resistance versus temperature from a factor of 10^9 to a factor of 4 in the temperature range 140-3 K. The onset temperature of the resistance rise is also suppressed with pressure. These results, combined with the x-ray results[1] which show the formation of a charge density wave (CDW) at 140 K, suggest that the Anderson transition is driven by the CDW which is, in turn, rapidly depressed by pressure. The results of these experiments demonstrate a strong correlation between the Anderson transition and the CDW.